Having thus described the invention, we claim:

1. An improved efficiency, reduced carbon dioxide emissions method for providing power for refrigerant compression and shared electrical power for a light hydrocarbon gas liquefaction process, the method comprising:

a) providing at least a portion of electrical power for the light hydrocarbon gas liquefaction process from at least one electrical generator driven by at least one fossil fuel-fired turbine; and,

b) compressing a low-pressure refrigerant to an increased pressure in at least one refrigerant compressor driven by an electric motor powered by electrical power generated by the at least one electrical generator.

2. The method of claim 1 wherein the light hydrocarbon gas is natural gas.

3. The method of claim 1 wherein the turbine is fueled by a compressed air stream and a light hydrocarbon gas stream.

4. The method of claim 1 wherein the at least one turbine is fueled with a light hydrocarbon gas.

5. The method of claim 4 wherein an air stream and the light hydrocarbon gas are combusted in a combustion zone to produce a high-temperature high-pressure gas stream to power the turbine and discharge a high-temperature exhaust gas stream.

6. The method of claim 5 wherein the high-temperature exhaust gas stream is passed in heat exchange contact with one of water or low-pressure steam to produce steam.

7. The method of claim 6 wherein a turbine coupled to an energy recovery electrical generator is driven by the steam to generate electrical power and low-pressure steam.

8. The method of claim 7 wherein the produced electrical power is placed on the power grid for the light hydrocarbon gas liquefaction process.

9. The method of claim 1 wherein all of the refrigerant compressors are driven by electric motors.

10. The method of claim 1 wherein a portion of electrical power for the light hydrocarbon gas liquefaction process is obtained from an external power source.

11. An improved efficiency, reduced carbon dioxide emissions method for providing power for refrigerant compression and shared electrical power for a light hydrocarbon gas liquefaction process, the method consisting essentially of:

a) providing at least a portion of electrical power for the light hydrocarbon gas liquefaction process from at least one electrical generator driven by at least one fossil fuel-fired turbine; and,

b) compressing a low-pressure refrigerant to an increased pressure in at least one refrigerant compressor driven by an electric motor powered by electrical power generated by the at least one electrical generator.

12. An improved efficiency, reduced carbon dioxide emissions method for providing power for refrigerant compression to a light hydrocarbon gas liquefaction process, the method comprising:

a) providing electrical power for the light hydrocarbon gas liquefaction process from at least one source; and

b) compressing a low-pressure refrigerant to an increased pressure in at least one refrigerant compressor driven by an electric motor powered with the electrical power from a).

13. An improved efficiency, reduced carbon dioxide emissions system for providing refrigerant compression and shared electrical power for a light hydrocarbon gas liquefaction process, the system comprising:

a) at least one electrical generator driven by a fossil fuel fired turbine and operable to provide an electrical power supply for the light hydrocarbon gas liquefaction process; and,

b) a low-pressure refrigerant compressor driven by an electrical motor in electrical communication with the electrical power supply for the light hydrocarbon gas liquefaction process and powered by electrical power from the electrical power supply.

14. The system of claim 13 wherein the at least one electrical generator produces substantially all of the electrical power required for the light hydrocarbon liquefaction process.

15. The system of claim 13 wherein the system includes a plurality of electrical generators.

16. The system of claim 13 wherein the system includes a plurality of turbines.

17. The system of claim 13 wherein each turbine includes a high-pressure air inlet into a combustion zone from which a high-temperature high-pressure combustion gas stream is passed to an inlet to the turbine to drive the turbine and produce a high-temperature, low-pressure exhaust gas stream discharged through an exhaust gas outlet from the turbine.

18. The system of claim 17 wherein the system includes an air compressor to supply high-pressure air to the high-pressure air inlet.

19. The system of claim 18 wherein the system includes a heat exchanger in fluid communication with the exhaust gas outlet, the heat exchanger including an exhaust gas inlet and an exhaust gas outlet and a water or low-pressure steam inlet and a higher pressure steam outlet.

20. The system of claim 19 wherein the system includes an energy recovery electrical generator, operable to produce electrical power for the light hydrocarbon

liquefaction process, and driven by a steam turbine having a higher pressure steam inlet and a low-pressure steam outlet.

21. The system of claim 20 wherein the steam turbine includes a reduced temperature steam outlet in fluid communication with the low-pressure steam inlet to the heat exchanger.

22. The system of claim 13 wherein the refrigerant compressors are adapted to produce at least one compressed refrigerant at a selected pressure.

23. The system of claim 13 wherein the refrigerant compressors are adapted to produce compressed refrigerant at a selected pressure and of a selected volume.

24. An improved efficiency, reduced carbon dioxide emissions system for providing power for refrigerant compression to a light hydrocarbon gas liquefaction process, the system comprising:

a) an electrical power supply for the light hydrocarbon gas liquefaction process; and

b) a low-pressure refrigerant compressor driven by an electrical motor electrically connected to the electrical power supply.